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Author: Ms. Nadezhda Lukicheva
Institute of Biomedical Problems (IBMP), Russian Academy of Sciences (RAS), Russian Federation, luckichyowa.n@yandex.ru

Mr. Kirill Gordienko
Institute of Biomedical Problems (IBMP), Russian Academy of Sciences (RAS), Russian Federation, k.vl.gordienko@gmail.com
Dr. Elena Sadchikova
Russian Federation, e.r.sadchikova@gmail.com
Dr. Galina Vassilieva
Institute of Biomedical Problems (IBMP), Russian Academy of Sciences (RAS), Russian Federation, galvassilieva@mail.ru

EVALUATION OF THE LACTOFERRIN INFLUENCE ON THE INDICATORS OF BONE TISSUE METABOLISM AT 21-DAY UNLOADING OF THE HIND LIMBS IN RATS

Abstract

The search for means of preventing mineral-bone disorders is relevant for the bone loss of various origins, including that caused by space flights (SF). In the present study, we used the protein lactoferrin (biosimilar human, hLF), which is a multifunctional factor of natural immunity, tissue differentiation, and cell activation, as one of the possible non-pharmacological means of preventing mineral density loss and disordered bone remodeling during SF. The influence of LF on bone metabolism in Wistar male rats during a 21-day hindlimb suspension (HIS) was evaluated for the first time.

The animals weighing 226.0 (214.15–238.5) g were randomly divided into 6 groups (n = 8). Three groups received 200 μg/kg of hLF orally daily; three groups received a placebo. Two hLF groups (HLF) and two placebo groups (HPL) were exposed to HIS conditions; the rest of the animals were vivarium controls (VC). One group after HIS with hLF and one group after HIS with placebo continued with a 21-day readaptation (RLF/RPL); all other animals were euthanized.

BMD, BMC, and area (DXA, Hologic) of the femur and tibia were analyzed (postmortem), and serum levels of 1,25(OH)2D3, ACTH, PTH, RANKL, OPG, and FGF-23 (ELISA, Cloud-Clone) were studied.

BMD, BMC, and area in both bones were significantly lower after HIS than in vivarium animals. RLF differed from RPL in terms of the level of BMD in the tibia (higher in the group with hLF).

Indicators of the bone state are significantly higher in animals after readaptation than in animals after HIS or VC. From our point of view, the results of the 1,25(OH)2D3 analysis, which showed an excess of its mean values in the hLF groups compared to their corresponding placebo groups, are of interest. There were differences ($p<0.05$) between individual groups in terms of RANKL, OPG, and ACTH levels.

Thus, the results of the research on the bone remodeling processes in animals with LF were obtained, which allowed us to continue studies with higher doses of hLF and a longer duration of HIS and readaptation.

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